

**ANNEX  
BETWEEN  
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
AMES RESEARCH CENTER  
AND  
UNIVERSITY OF COLORADO AT BOULDER  
UNDER SPACE ACT UMBRELLA AGREEMENT NO. SAA2-403529  
(ANNEX NUMBER ONE)**

**ARTICLE 1. PURPOSE**

The purpose of this annex is to allow collaborative exploration and development of high temperature materials for hypersonics applications. This activity may result in significant insights into thermal protection system performance at hypersonic speeds, which may have considerable utility on future space missions that involve planetary atmospheric entry. The University will provide NASA with access to its unique Uncertainty Quantification tools for analyzing high temperature materials. Investigations of the advanced materials, such as Ultra High Temperature Ceramics (UHTC), ceramic carbides, and Uncertainty Quantification tools, may lead to new innovations that benefit the national hypersonics infrastructure capacity.

This activity will also connect NASA with Partner's students, to allow them exposure to NASA research in hypersonics, and to support NASA's goals in Science, Technology, Engineering, and Mathematics (STEM) Engagement.

The legal authority for this Annex, consistent with the Umbrella Agreement, is in accordance with the National Aeronautics and Space Act (51 U.S.C. § 20113(e)).

**ARTICLE 2. RESPONSIBILITIES**

A. NASA ARC will use reasonable efforts to:

1. Provide existing Ultra High Temperature Ceramics (UHTC) arc jet data to Partner, to enable evaluation of high temperature materials for hypersonics applications
2. Provide Computed Tomography (CT) scans to Partner, so that partner can use tools to assess high temperature materials for hypersonics applications.
3. Ensure appointed NASA Mentors take the requisite NASA Mentor training
4. Host the Partner's students virtually for the collaborative UHTC, ceramic carbides and Atomic Layer Deposition (ALD) coatings activities that will be collaborated under this Annex Agreement.
5. Jointly publish paper in a professional journal on UHTC data and analysis.

B. Partner will use reasonable efforts to:

1. Provide NASA with access to its Uncertainty Quantification tools for exploration and analysis of high temperature materials for hypersonics applications
2. Complete and share UHTC arc jet data analysis on data sets provided by NASA ARC.
3. Provide analysis of CT scan results/data sets provided by NASA ARC.
4. Identify summer students who will participate in collaborative research activities onsite at NASA ARC. The students must meet all physical and information technology security requirements for access to NASA ARC
5. Ensure selected student interns take NASA's required student intern training
6. Jointly publish paper in a professional journal on UHTC data and analysis.

### ARTICLE 3. SCHEDULE AND MILESTONES

The planned major milestones for the activities for this Annex defined in the "Responsibilities" Article are as follows:

<b>Milestone</b>	<b>Estimated Completion Date</b>
Conduct a kick-off online meeting (Joint)	One month after execution of this Annex
Provide Ultra High Temperature Ceramics (UHTC) arc jet data to Partner (NASA)	Six months after execution of this Annex
Conduct online review meetings every six months from execution through the end of this Annex (Joint)	Five years after execution of this Annex
Provide CT scans to Partner, for Partner to assess high temperature materials for hypersonics applications (NASA)	Six months after execution of this Annex
Provide NASA with access to its Uncertainty Quantification tools (Partner)	One year after execution of this Annex
Complete and share UHTC arc jet data analysis (Partner)	Three years after execution of this Annex

Provide analysis of NASA CT scan results/data sets (Partner)	Five years after execution of this Annex
Publish joint paper on UHTC data and analysis	Five years after execution of this Annex

#### ARTICLE 4. FINANCIAL OBLIGATIONS

There will be no transfer of funds between the Parties under this Agreement and each Party will fund its own participation. All activities under or pursuant to this Agreement are subject to the availability of funds, and no provision of this Agreement shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, (31 U.S.C. § 1341).

#### ARTICLE 5. INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS

A. Data produced under this Annex which is subject to paragraph C. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement will be protected for the period of one year.

B. Under paragraph H. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement, Disclosing Party provides the following Data to Receiving Party. The lists below may not be comprehensive, are subject to change, and do not supersede any restrictive notice on the Data provided.

1. Background Data:

The Disclosing Party's Background Data, if any, will be identified in a separate technical document.

2. Third Party Proprietary Data:

The Disclosing Party's Third Party Proprietary Data, if any, will be identified in a separate technical document.

3. Controlled Government Data:

The Disclosing Party's Controlled Government Data, if any, will be identified in a separate technical document.

4. The following software and related Data will be provided to Partner under a separate Software Usage Agreement:

None

ARTICLE 6. TERM OF ANNEX

This Annex becomes effective upon the date of the last signature below (“Effective Date”) and shall remain in effect until the completion of all obligations of both Parties hereto, or five years from the Effective Date, whichever comes first, unless such term exceeds the duration of the Umbrella Agreement. The term of this Annex shall not exceed the term of the Umbrella Agreement. The Annex automatically expires upon the expiration of the Umbrella Agreement.

ARTICLE 7. RIGHT TO TERMINATE

Either Party may unilaterally terminate this Annex by providing thirty (30) calendar days written notice to the other Party.

ARTICLE 8. POINTS OF CONTACT

The following personnel are designated as the Points of Contact between the Parties in the performance of this Annex.

Management Points of Contact

NASA Ames Research Center  
Brenden Sanborn  
Agreement Manager  
Mail Stop: 202A-3  
Moffett Field, CA 94035  
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Director of Contracts  
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Technical Points of Contact

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ARTICLE 9. MODIFICATIONS

Any modification to this Annex shall be executed, in writing, and signed by an authorized representative of NASA and the Partner. Modification of an Annex does not modify the terms of the Umbrella Agreement.

**ARTICLE 10. SIGNATORY AUTHORITY**

The signatories to this Annex covenant and warrant that they have authority to execute this Annex. By signing below, the undersigned agrees to the above terms and conditions.

**NATIONAL AERONAUTICS AND  
SPACE ADMINISTRATION  
AMES RESEARCH CENTER**

**UNIVERSITY OF COLORADO  
AT BOULDER**

BY: \_\_\_\_\_  
Rupak Biswas  
Director of Exploration Technology

BY: *Gary L Henry* \_\_\_\_\_  
Gary L Henry  
Director of Contracts

DATE: \_\_\_\_\_

DATE: 14 April 2021